Prof. Allbutt speaks with authority and full knowledge. He points out to the medical student who through comparative indigence has to proceed from the secondary to the medical school without the initiatory university course with which his more opulent contemporary is favoured, that "there is no difficulty, at any rate in university education, in using for general training the broader principles of any one of the professional faculties." Applying his principle already quoted, that it is not what is taught but how it is taught, Dr. Allbutt shows how professional studies may be made sources of culture and broad ideas by the non-university medical student. But there is in no sense a disparagement of the unique value of a good university course, with its chances of intercourse with many types of intellect and the opportunities the student has of learning the best which has been done and said in the world.

The question of examiners and examinations is dealt with also. We are told that "the professional examiner, he who makes it his business to range from place to place imposing mechanical tests wholesale, is one of the new terrors of life." We are not introduced, however, to the evil effects of examinations upon the examiners. The examiners are, in many cases, distinguished men of science who eke out insufficient emoluments by undertaking examining work in their leisure hours—time which, in a rationally organised system that recognised the workman to be worthy of his hire, would be devoted to research work. Enough has been heard of the evil effects of examinations upon students, and, indeed, much has been done in the direction of judicious inspection to remedy these, and it is time to recognise that the employment of eminent leaders in science to do the work which competent teachers can perform better is an improvident use of our best intellects.

We notice, in conclusion, that Prof. Allbutt sums up the end of education to be action. "We learn, that we may do," he says. The educated man must not rest satisfied with his education, and be content selfishly to enjoy the intellectual gratifications placed at his disposal. Like each one of us, the educated man is one member of a complex society with many needs to be satisfied, many abuses to be swept away, many wrongs to be redressed. The privileges the educated man has enjoyed, and the sources of satisfaction his education has revealed to him, should serve as incentives urging him to work for the advancement of his race and the further development of human society.

A. T. S.

A MARE'S NEST.

The Utilisation of Nitrogen in Air by Plants. By T. Jamieson. Pp. 82+18. (Aberdeen: The Agricultural Research Association, 1905.)

MATTHEW ARNOLD has somewhere a finely ironical passage in which he comments upon the British habit of labelling its institutions with a great name without considering whether they possess any great thing to correspond, and certainly the name of "Research" has rarely been more taken in vain than in the present publication. The Agricultural Research Association appears to be a body of gentlemen in the neighbourhood of Aberdeen who maintain certain experimental plots under the direction of Mr. T. Jamieson. It is further assisted by grants from the County Council and from the Board of Agriculture, and it has issued the above report for 1905, heralded by some startling preliminary trumpets in the Scottish Press. Briefly speaking, Mr. Jamieson claims to have "discovered" "that plants generally absorb free nitrogen directly from the air, and transform it into albumen." He proposes to wipe out agricultural science between the dates of De Saussure and himself, writing, indeed, with a curious resemblance to the amateur speculations of sixty years ago.

Mr. Jamieson begins by demolishing, to his own satisfaction, the theory that leguminous plants fix nitrogen by the agency of bacteria, and the quality of his argument may be gauged from the following passage:—"It should be borne in mind, also, that bacteria were *never proved to be present.* The small particles found in the tubercles were merely *assumed* to be bacteria." What are we to say to a man who proposes to dismiss the nineteen years' work of some scores of investigators in every country by denying a fact he could demonstrate to himself at any moment had he the most elementary acquaintance with the manipulation of bacteria? But no; Mr. Jamieson prefers to speculate on his own, without even reading up the subject. There is a curious footnote on p. 29 which, we imagine, is meant to display Mr. Jamieson's acquaintance with the literature of nitrogen fixation; a list of authorities is given, equally amazing as regards either its inclusions, its omissions, or its spellings of proper names. Beyerinck appears variously as Burginck and Beirjerenck. But when we leave Mr. Jamieson's criticism and turn to his constructive work the result is even more amazing. He takes an ordinary plant, spurrey, for example, and finds certain hairs on the leaves. To ascertain the purpose of these hairs he applies to them iodine or some other reagent capable of staining proteid. He finds that the tips of these hairs, which are at first empty and then become green with chlorophyll, give later a reaction for albumen, which disappears again as the hairs age. "If the formation of albumen takes place in the tip of this hair, one would expect to find its absence in the early stage, its presence in the later or active stage, its discharge through the channels and round the cells of the plant, and its possible absence in the latest stages—and this is what has actually been found."

"The evidence that nitrogen is absorbed by these tips, and is there fixed and manufactured into albumen, is thus as complete as could well be desired." "The direct absorption of nitrogen, and its direct fixation as albumen, thus seems demonstrated even more satisfactorily than is possible by chemical analysis," and none, accordingly, is attempted. "'Tis safer so," as the American poet puts it. Mr. Jamieson does not bring forward a single experiment to demonstrate that nitrogen has been fixed by any of his plants; this fundamental fac (?) he assumes.

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The fact that many investigators like Boussingault and Lawes and Gilbert found no fixation of nitrogen during the growth of plants Mr. Jamieson dismisses on the ground that the plants under experiment had not attained their normal vigour, forgetting that Lawes and Gilbert had dealt with and dismissed this very point in their field experiments upon root crops. Mr. Jamieson even argues that the growth of the leafy turnip crop with small or no nitrogenous dressings implies that the crop has drawn its nitrogen from the atmosphere, whereas this is the standard example in the lecture-room of how the great reserves of nitrogen in the soil can be made to feed the plant if nitrification be promoted by the frequent cultivations and the high soil temperatures which characterise the growth of the turnip crop.

It is on this sort of foundation that Mr. Jamieson proposes to re-build the whole edifice of agricultural science; really the thing would be amusing were it not so dangerous and discreditable to the cause of scientific research. Mr. Jamieson has a following. Putting aside his official backing, and the dukes, earls, and marquises who figure as patrons, there is a body of solid farmers and landowners who sit under him and take advice on practical matters which they suppose to represent the last word of science. Accustomed to the amenities of theological disputation, these men like their agricultural science in the same style; not the dry light of reason, but a strenuous assertion of a monopoly of the truth, rhetoric and passion, and a vigorous denunciation of the other side—all these they get from Mr. Jamieson. But it is a windy diet, and sooner or later disagrees with the subject, whereupon science gets the blame.

A. D. H.

OUR BOOK SHELF.

Technical Methods of Ore Analysis. By A. H. Low. Pp. x+273. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1905.)

THIS book is of interest as showing the exact methods of analysis of ores in use in the United States at the present time. The author is a member of a well known and old-established firm of analysts and assayers in Denver whose results are accepted with respect by miners and smelters in the western States. It is unusual for such a man to publish exact descriptions of the methods used in his office, as any discoverable flaw in a method might be seized on and magnified by his rivals with prejudicial results to his business. Now that Mr. Low has shown so much courage, his example may be followed.

The book contains detailed descriptions of the estimation of the ordinary constituents of ores, omitting all "fire methods" of assay. The details are minute enough to be tiresome in reading the book through, the account of the precautions to be taken in volumetric analysis, for example, being repeated whenever a volumetric method is reached. In this swarm of details the salient points of the methods are lost, and as the headings are somewhat vague, careful search is necessary to find out what method is being described. An analyst must generally read the whole of a section if he wishes to refresh his memory on some particular point, and will count himself fortunate if he has hit on the right section. Nevertheless, the point will probably be in the book, to be discovered by perseverance.

The methods are usually good and carefully described. It seems a pity that Mr. Low should designate the determination of zinc by ferrocyanide the "author's method," without referring to Galetti or Fahlberg, to whom he is indebted for so much, but there is probably no intention to deceive. Also, in the estimation of copper by iodide, the practice of adding a solution of potassium iodide, instead of crystals, is recommended without any warning as to the decomposition of the solution if it is kept for some time. However, the book is generally trustworthy and useful. There is no book like it, and the analyst will naturally have a copy on his shelf.

The Lepidoptera of the British Islands. A Descriptive Account of the Families, Genera, and Species Indigenous to Great Britain and Ireland, their Preparatory States, Habits, and Localities. By Charles G. Barrett. Vol. x. Pp. 384. Heterocera: Pyralidina—Tortricina. (London: Lovell Reeve and Co., Ltd., 1905.)

SINCE our notice of the last volume of this work entomologists have to regret the death of the accomplished author, well known as one of the best practical lepidopterists in England long before he commenced the elaborate monograph which he did not live to complete. Hitherto, however, there has been no interruption in the publication of the successive parts, and we understand that the manuscript was left practically complete to the end of the Tortricina, which is the more satisfactory as the Tortricina are a large and difficult group which have been somewhat neglected by most British lepidopterists, but to which Mr. Barrett devoted special attention.

The families included in vol. x. are Pyralidina; Phycitidæ (conclusion), 13 genera (Cateremna to Plodia); Anerastiidæ (genus Anerastia), Crambidæ (6 genera), Galeriidæ (5 genera), Tortricina, Tortricidæ (17 genera), Cnephasidæ (5 genera), Lozoperidæ (7 genera), Sercoridæ (commencement, 4 genera).

The general arrangement of the present volume is similar to that employed in preceding volumes, and the remarks on the habits of the insects are detailed and interesting. For example, we are told that the first species in the volume (*Cateremna terebrella*, Zinck.) has a curious habit of emerging during thunderstorms, these being, as is well known, frequent in the eastern counties. The history of the various species, small and inconspicuous as many of them are, is very fully given throughout.

W. F. K.

A First Reader in Health and Temperance. By W. Taylor. Pp. iv+219. (London, Westminster: Church of England Temperance Society and G. Philip and Son, Ltd., n.d.) Price 1s. 6d.

IN this small book the instruction is given in forty-three lessons wherein all difficult words are avoided so far as possible, and when such words are necessary their meaning is always explained. The elementary matter dealt with is suitably illustrated, and the work is in every respect to be commended.

The various physiological requirements of the body are explained in simple language, and it is shown that alcohol is not only unnecessary but may be actually detrimental to every healthy function. Abstention from alcohol is, in fact, the dominant text of the book.

It is not easy to conceive a book better suited to meet the needs for which it is designed. The subject of personal hygiene is made interesting and it is treated in a very happy and lucid manner, appropriate to the intellectual powers of young children, for whom the book is designed to serve as a first reader.

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